

## REMARKS

As a preliminary matter, Applicants thank the Examiner for the acknowledgment of allowable subject matter in claims 4 and 15.

Claims 1-3 and 5-6 stand rejected under 35 U.S.C. 102(b) as being anticipated by Fontana et al. (U.S. 5,898,547). Applicants respectfully traverse this rejection because the cited reference does not disclose (or suggest) a barrier layer for a ferromagnetic tunnel junction having a thinner first region and a thicker second region surrounding the first region, where both regions are located on the free layer in a layer-stacking direction, as in claim 1 of the present invention, as amended.

Applicants submit that the Examiner has not established a proper Section 102 rejection against the present invention. The Examiner asserts that the “barrier layer” shown by Fontana is the sum of Fontana’s insulating tunnel barrier layer 120 and the insulating layer 160. The Examiner’s grouping together of these two different layers 120, 160 as a single “barrier layer” is an erroneous interpretation of the prior art, and contrary to the clear teachings of Fontana.

Fontana describes only the layer 120 as a “barrier layer.” The insulating layer 160, on the other hand, is shown by Fontana to be entirely separate the magnetic tunnel junction 100. Fontana shows this insulating layer 160 to be only *adjacent* to the junction 100, and not otherwise forming any part of it. (See Fig. 4). Therefore, the insulating tunnel barrier layer 120 is the only “barrier layer” shown by Fontana to comprise part of the junction 100.

In contrast, claim 1 of the present invention as last amended recites, among other things, that the barrier layer, along with its first and second regions of differing thicknesses, form part of the ferromagnetic tunnel junction itself. As discussed above, Fontana shows only one layer (120) as actually forming a portion of the junction 100, and this layer is clearly shown to have only a single, constant thickness. Accordingly, for at least these reasons, the Section 102 rejection against claim 1 of the present invention (and its dependent claims) is respectfully traversed.

Moreover, and irrespective of the discussion above, Applicants further traverse the rejection because no fair interpretation of the Fontana reference would find that both the layers 120 and 160 could both be “on” the free layer 132. In his rejection, the Examiner appears to freely interchange the terms “on” and “adjacent to” with respect to the several cited layers. Regardless of which term is correct, Applicants submit that the two terms should not be freely interchanged within the same claim.

Fig. 4 of Fontana shows the layer 120 on the free layer 132 in one direction, but the layer 160 only adjacent to the free layer 132 in a different direction. Applicants submit that a proper reading of Fig. 4 of Fontana could find that only one of the layers 120 or 160 could be “on” the free layer 132, but not both. The specific configuration shown by Fontana excludes the two separate layers from being grouped together as a single layer with respect to being “on” the free layer. For at least these additional reasons, the Section 102 rejection is again respectfully traversed.

Nevertheless, in the interests of expediting prosecution, Applicants have amended claim 1 to clarify that the recited barrier layer, as well as its first and second regions, are located on the free layer in a layer-stacking direction. Although Applicants submit that such an amendment should not be necessary to overcome the outstanding Section 102 rejection, this additional claim language necessarily excludes the Examiner's overly broad interpretation of the Fontana reference. Fontana's layer 160 is not on any free layer in a layer-stacking direction. Accordingly, for these further reasons, the Section 102 rejection based on Fontana is once again traversed.

Claims 7-14 and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Fontana in view of Fujishima et al. (JP 07073419). Applicants respectfully traverse this rejection because neither of the cited references, whether taken alone or in combination, discloses or suggests a ferromagnetic tunnel junction element for a magnetic head which includes a free layer having an end portion that extends and projects from the tunnel junction element toward one of the shield layers, and in a direction different from the direction in which the several other layers extend, as in claim 7 of the present invention, as now amended.

Although not cited by the Examiner, Applicants assume that the Examiner refers to Fig. 5 of Fontana in his remarks on page 3 of Paper No. 14. And although Applicants acknowledge that Fig. 5 does show a portion of the layer 132 projecting from the junction 100, this projecting portion still extends in the same direction of the several layers (116, 120, 206, 208, 210, 212) that make up the junction 100. Additionally, Fontana clearly

shows that the layer 132 extends in a single direction (or plane) only, with no portion of the layer 132 extending in a direction toward either shield layer S1 or S2, and without contacting either shield layer.

In contrast, claim 7 of the present invention has been amended to clarify that the extending/projecting end portion of the free layer extends toward one of the shield layers, and in a direction different from the parallel directions of the several other layers. As discussed above, Fontana shows no such configuration. Fontana's layer 132 extends in a single direction, or plane, with no portion of the layer 132 extending or projecting in any direction different from the several layers of the junction 100.

Fujishima, on the other hand, is cited by the Examiner merely for teaching to ground an MR element (4) to a shield layer (6). Nowhere, however, does Fujishima teach or suggest to extend a portion of the free layer itself in a direction toward the shield layer, or that this extending portion of the free layer actually contacts the shield layer. Even if the Examiner's assertion were correct, that Fujishima's MR element 4 is somehow analogous to the free layer of the present invention (which Applicants do not concede), Fujishima still fails to teach or suggest anywhere that a portion of the MR element 4 itself somehow extends in a direction toward the shield layer 6, or contacts it directly. In fact, Fujishima specifically teaches otherwise.

Fujishima shows the MR element 4/4a to be of a single piece only, and extending in the same parallel direction as the several other layers shown. (See Figs. 1a, 1b). No direct contact between the MR element 4 or the shield layer 6 is ever shown. Grounding

only occurs between the two layers by way of *separate and different* lead sections 13a, 13b, as well as the contact section B. Fujishima does not teach that these lead/contact sections are actually part of, or function as, a free layer.

In contrast, claim 7 of the present invention does not merely recite that the free layer is grounded to the shield layer, but instead the specific structural configuration discussed above, and one that is neither taught nor suggested by the prior art. Accordingly, for at least these reasons, the Section 103 rejection of claim 7 (and its dependent claims) is respectfully traversed.

Furthermore, the Examiner is not only required to cite to where in the prior art exist all of the claimed limitations and features of the present invention. The Examiner has the additional burden to consider the distinct advantages realized by the present invention over the combination of prior art references, when attempting to establish a *prima facie* case of obviousness. Applicants again submit that, even if the Examiner's proposed combination were proper, neither of the two cited references, alone or in combination, could realize the advantages of the present invention.

Specifically, the combination of the two cited references could not achieve the manufacturing and production advantages that would the simplified structural configuration of the present invention. The motivation asserted by the Examiner for the proposed combination is merely to increase the yield of the MR head and prevent static electricity from discharging though the MR head. This motivation alone, however, could never suggest the more elegant and cost-efficient structures recited and disclosed by the present invention.

Fujishima in particular requires a very complex structure that could not be manufactured as efficiently as that of the present invention, nor would it achieve the same yield. Accordingly, because the present invention thus yields significant advantages over both cited references alone or in combination, the Section 103 rejection based on the combination of Fontana with Fujishima is once again traversed.

Claims 16 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Fontana. Applicants respectfully traverse this rejection for at least the reasons discussed above. Claims 16 and 18 both depend directly or indirectly from independent claims 1 or 7, and therefore include all of the features of the respective base claims, plus additional features. Accordingly, claims 16 and 18 should be in condition for allowance for at least the reasons discussed above.

For all of the foregoing reasons, Applicants submit that this Application, including claims 1-18, is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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June 21, 2004

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